

SEQUENCE LISTING

<110> DEWOLF, WALTER E. JR
KALLENDER, HOWARD
LONSDALE, JOHN T.

<120> METHODS FOR MAKING AND USING FATTY ACID
SYNTHESIS PATHWAY REAGENTS

<130> GM50068

<140> TO BE ASSIGNED
<141> 2002-03-25

<150> PCT/US00/29451
<151> 2000-10-26

<150> 60/161,775
<151> 1999-10-27

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ccattccatt catcgctaata gaaagtgtt gaagaagatt tttcaagtta cattaatcaa 720
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<210> 2

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<212> PRT

<213> Staphylococcus aureus

<400> 2

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Pro Gly Gln Gly Ala Gln Lys Val Gly Met Ala Gln Asp Leu Phe Asn
      35           40           45
Asn Asn Asp Gln Ala Thr Glu Ile Leu Thr Ser Ala Ala Lys Thr Leu
      50           55           60
Asp Phe Asp Ile Leu Glu Thr Met Phe Thr Asp Glu Glu Gly Lys Leu
65           70           75           80
Gly Glu Thr Glu Asn Thr Gln Pro Ala Leu Leu Thr His Ser Ser Ala
      85           90           95
Leu Leu Ala Ala Leu Lys Ile Leu Asn Pro Asp Phe Thr Met Gly His
      100          105          110
Ser Leu Gly Glu Tyr Ser Ser Leu Val Ala Ala Asp Val Leu Ser Phe
      115          120          125
Glu Asp Ala Val Lys Ile Val Arg Lys Arg Gly Gln Leu Met Ala Gln
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Ala Phe Pro Thr Gly Val Gly Ser Met Ala Ala Val Leu Gly Leu Asp
145          150          155          160
Phe Asp Lys Val Asp Glu Ile Cys Lys Ser Leu Ser Ser Asp Asp Lys
      165          170          175
Ile Ile Glu Pro Ala Asn Ile Asn Cys Pro Gly Gln Ile Val Val Ser
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 Gly Ala Lys Arg Val Met Pro Leu Ala Val Ser Gly Pro Phe His Ser
 210 215 220
 Ser Leu Met Lys Val Ile Glu Glu Asp Phe Ser Ser Tyr Ile Asn Gln
 225 230 235 240
 Phe Glu Trp Arg Asp Ala Lys Phe Pro Val Val Gln Asn Val Asn Ala
 245 250 255
 Gln Gly Glu Thr Asp Lys Glu Val Ile Lys Ser Asn Met Val Lys Gln
 260 265 270
 Leu Tyr Ser Pro Val Gln Phe Ile Asn Ser Thr Glu Trp Leu Ile Asp
 275 280 285
 Gln Gly Val Asp His Phe Ile Glu Ile Gly Pro Gly Lys Val Leu Ser
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<213> Staphylococcus aureus

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 Ala Thr Glu Ile Leu Thr Ser Ala Ala Lys Thr Leu Asp Phe Asp Ile
 35 40 45
 Leu Glu Thr Met Phe Thr Asp Glu Glu Gly Lys Leu Gly Glu Thr Glu
 50 55 60
 Asn Thr Gln Pro Ala Leu Leu Thr His Ser Ser Ala Leu Leu Ala Ala
 65 70 75 80
 Leu Lys Ile Leu Asn Pro Asp Phe Thr Met Gly His Ser Leu Gly Glu
 85 90 95
 Tyr Ser Ser Leu Val Ala Ala Asp Val Leu Ser Phe Glu Asp Ala Val
 100 105 110

Lys Ile Val Arg Lys Arg Gly Gln Leu Met Ala Gln Ala Phe Pro Thr
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 Gly Val Gly Ser Met Ala Ala Val Leu Gly Leu Asp Phe Asp Lys Val
 130 135 140
 Asp Glu Ile Cys Lys Ser Leu Ser Ser Asp Asp Lys Ile Ile Glu Pro
 145 150 155 160
 Ala Asn Ile Asn Cys Pro Gly Gln Ile Val Val Ser Gly His Lys Ala
 165 170 175
 Leu Ile Asp Glu Leu Val Glu Lys Gly Lys Ser Leu Gly Ala Lys Arg
 180 185 190
 Val Met Pro Leu Ala Val Ser Gly Pro Phe His Ser Ser Leu Met Lys
 195 200 205
 Val Ile Glu Glu Asp Phe Ser Ser Tyr Ile Asn Gln Phe Glu Trp Arg
 210 215 220
 Asp Ala Lys Phe Pro Val Val Gln Asn Val Asn Ala Gln Gly Glu Thr
 225 230 235 240
 Asp Lys Glu Val Ile Lys Ser Asn Met Val Lys Gln Leu Tyr Ser Pro
 245 250 255
 Val Gln Phe Ile Asn Ser Thr Glu Trp Leu Ile Asp Gln Gly Val Asp
 260 265 270
 His Phe Ile Glu Ile Gly Pro Gly Lys Val Leu Ser Gly Leu Ile Lys
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 Val Lys Gly Trp Asn Glu Asn Asp
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<213> Staphylococcus aureus

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 gaaagacatt gggcagatga cgatcaagat acttcagatt tagcatatga agcaagtgtg 240
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 gcaactggag atatgccatt tccaactgtc gcaaatatgt tgcaagaacg tttaggggacg 360

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 aaattatcta aaataacaga tttaactgac cgcttctactg cagttctatt tggagatggg 540
 gcaggtgcgg ttatcatcgg tgaagtttca gaaggcagag gtattataag ttatgaaatg 600
 ggttctgatg gcactgggtg taaacattta tatttagata aagatactgg taaactgaaa 660
 atgaatggtc gagaagtatt taaatttgct gttagaatta tgggtgatgc atcaacacgt 720
 gtagttgaaa aagcgaattt aacatcagat gatataagatt tatttattcc tcatcaagct 780
 aatattagaa ttatggaatc agctagagaa cgcttaggta tttcaaaaga caaatgagt 840
 gtttctgtaa ataaatatgg aaatacttca gctgcgtcaa tacctttaag tatcgatcaa 900
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<212> PRT

<213> Staphylococcus aureus

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			20					25					30		
Pro	Glu	Lys	Ile	Ile	Asp	Asn	Ala	Tyr	Phe	Glu	Gln	Phe	Leu	Asp	Thr
		35					40					45			
Ser	Asp	Glu	Trp	Ile	Ser	Lys	Met	Thr	Gly	Ile	Lys	Glu	Arg	His	Trp
	50					55					60				
Ala	Asp	Asp	Asp	Gln	Asp	Thr	Ser	Asp	Leu	Ala	Tyr	Glu	Ala	Ser	Val
65				70					75					80	
Lys	Ala	Ile	Ala	Asp	Ala	Gly	Ile	Gln	Pro	Glu	Asp	Ile	Asp	Met	Ile
			85					90						95	
Ile	Val	Ala	Thr	Ala	Thr	Gly	Asp	Met	Pro	Phe	Pro	Thr	Val	Ala	Asn
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Met	Leu	Gln	Glu	Arg	Leu	Gly	Thr	Gly	Lys	Val	Ala	Ser	Met	Asp	Gln
		115					120					125			
Leu	Ala	Ala	Cys	Ser	Gly	Phe	Met	Tyr	Ser	Met	Ile	Thr	Ala	Lys	Gln
	130					135					140				
Tyr	Val	Gln	Ser	Gly	Asp	Tyr	His	Asn	Ile	Leu	Val	Val	Gly	Ala	Asp
145				150					155					160	
Lys	Leu	Ser	Lys	Ile	Thr	Asp	Leu	Thr	Asp	Arg	Ser	Thr	Ala	Val	Leu
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Arg Gly Ile Ile Ser Tyr Glu Met Gly Ser Asp Gly Thr Gly Gly Lys
195 200 205
His Leu Tyr Leu Asp Lys Asp Thr Gly Lys Leu Lys Met Asn Gly Arg
210 215 220
Glu Val Phe Lys Phe Ala Val Arg Ile Met Gly Asp Ala Ser Thr Arg
225 230 235 240
Val Val Glu Lys Ala Asn Leu Thr Ser Asp Asp Ile Asp Leu Phe Ile
245 250 255
Pro His Gln Ala Asn Ile Arg Ile Met Glu Ser Ala Arg Glu Arg Leu
260 265 270
Gly Ile Ser Lys Asp Lys Met Ser Val Ser Val Asn Lys Tyr Gly Asn
275 280 285
Thr Ser Ala Ala Ser Ile Pro Leu Ser Ile Asp Gln Glu Leu Lys Asn
290 295 300
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<213> Staphylococcus aureus

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35 40 45
Asp Asp Asp Gln Asp Thr Ser Asp Leu Ala Glu Ala Ser Val Lys Ala
50 55 60
Ile Ala Asp Ala Gly Ile Gln Pro Glu Asp Ile Asp Met Ile Ile Val
65 70 75 80
Ala Thr Ala Thr Gly Asp Met Pro Phe Pro Thr Val Ala Asn Met Leu
85 90 95

Gln	Glu	Arg	Leu	Gly	Thr	Gly	Lys	Val	Ala	Ser	Met	Asp	Gln	Leu	Ala
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Ala	Cys	Ser	Gly	Phe	Met	Tyr	Ser	Met	Ile	Thr	Ala	Lys	Gln	Tyr	Val
			115					120					125		
Gln	Ser	Gly	Asp	Tyr	His	Asn	Ile	Leu	Val	Val	Gly	Ala	Asp	Lys	Leu
			130					135					140		
Ser	Lys	Ile	Thr	Asp	Leu	Thr	Asp	Arg	Ser	Thr	Ala	Val	Leu	Phe	Gly
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Asp	Gly	Ala	Gly	Ala	Val	Ile	Ile	Gly	Glu	Val	Ser	Glu	Gly	Arg	Gly
				165					170					175	
Ile	Ile	Ser	Tyr	Glu	Met	Gly	Ser	Asp	Gly	Thr	Gly	Gly	Lys	His	Leu
			180						185					190	
Tyr	Leu	Asp	Lys	Asp	Thr	Gly	Lys	Leu	Lys	Met	Asn	Gly	Arg	Glu	Val
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Phe	Lys	Phe	Ala	Val	Arg	Ile	Met	Gly	Asp	Ala	Ser	Thr	Arg	Val	Val
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Glu	Lys	Ala	Asn	Leu	Thr	Ser	Asp	Asp	Ile	Asp	Leu	Phe	Ile	Pro	His
225						230					235				240
Gln	Ala	Asn	Ile	Arg	Ile	Met	Glu	Ser	Ala	Arg	Glu	Arg	Leu	Gly	Ile
				245						250				255	
Ser	Lys	Asp	Lys	Met	Ser	Val	Ser	Val	Asn	Lys	Tyr	Gly	Asn	Thr	Ser
			260						265					270	
Ala	Ala	Ser	Ile	Pro	Leu	Ser	Ile	Asp	Gln	Glu	Leu	Lys	Asn	Gly	Lys
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Leu	Lys	Asp	Asp	Asp	Thr	Ile	Val	Leu	Val	Gly	Phe	Gly	Gly	Gly	Leu
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<212> DNA

<213> Staphylococcus aureus

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 gaacaaatgt tgactcgaat tccgttagca cgttttggtc aagacacaga tattgcta 660
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<212> PRT

<213> Staphylococcus aureus

<400> 8

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			20					25					30		
Val	Asn	Tyr	Ala	Gly	Ser	Lys	Glu	Lys	Ala	Glu	Ala	Val	Val	Glu	Glu
		35					40					45			
Ile	Lys	Ala	Lys	Gly	Val	Asp	Ser	Phe	Ala	Ile	Gln	Ala	Asn	Val	Ala
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Asp	Ala	Asp	Glu	Val	Lys	Ala	Met	Ile	Lys	Glu	Val	Val	Ser	Gln	Phe
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Gly	Ser	Leu	Asp	Val	Leu	Val	Asn	Asn	Ala	Gly	Ile	Thr	Arg	Asp	Asn
			85						90					95	
Leu	Leu	Met	Arg	Met	Lys	Glu	Gln	Glu	Trp	Asp	Asp	Val	Ile	Asp	Thr
		100						105					110		
Asn	Leu	Lys	Gly	Val	Phe	Asn	Cys	Ile	Gln	Lys	Ala	Thr	Pro	Gln	Met
		115					120					125			
Leu	Arg	Gln	Arg	Ser	Gly	Ala	Ile	Ile	Asn	Leu	Ser	Ser	Val	Val	Gly
	130					135						140			
Ala	Val	Gly	Asn	Pro	Gly	Gln	Ala	Asn	Tyr	Val	Ala	Thr	Lys	Ala	Gly
145					150					155				160	
Val	Ile	Gly	Leu	Thr	Lys	Ser	Ala	Ala	Arg	Glu	Leu	Ala	Ser	Arg	Gly
			165						170					175	
Ile	Thr	Val	Asn	Ala	Val	Ala	Pro	Gly	Phe	Ile	Val	Ser	Asp	Met	Thr
		180						185						190	

Glu	Pro	Phe	Phe	Gln	Gly	His	Phe	Pro	Glu	Tyr	Ala	Val	Met	Pro	Gly
65					70					75					80
Val	Leu	Ile	Thr	Glu	Ala	Leu	Ala	Gln	Thr	Gly	Ala	Val	Ala	Ile	Leu
				85					90					95	
Asn	Ser	Glu	Glu	Asn	Lys	Gly	Lys	Ile	Ala	Leu	Phe	Ala	Gly	Ile	Asp
				100				105					110		
Lys	Cys	Arg	Phe	Lys	Arg	Gln	Val	Val	Pro	Gly	Asp	Thr	Leu	Thr	Leu
		115					120					125			
Glu	Val	Glu	Ile	Thr	Lys	Ile	Lys	Gly	Pro	Ile	Gly	Lys	Gly	Asn	Ala
	130					135					140				
Lys	Ala	Thr	Val	Asp	Gly	Gln	Leu	Ala	Cys	Ser	Cys	Glu	Leu	Thr	Phe
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<212> DNA

<213> Staphylococcus aureus

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aacgttgatc aagtagaagt aggtaaaaca gcggcttact trttaagtga cttatcaagt 720
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<212> PRT

<213> Staphylococcus aureus

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35 40 45
Leu Glu Lys Leu Leu Glu Gln Leu Asn Gln Pro Glu Ala His Leu Tyr
50 55 60
Gln Ile Asp Val Gln Ser Asp Glu Glu Val Ile Asn Gly Phe Glu Gln
65 70 75 80
Ile Gly Lys Asp Val Gly Asn Ile Asp Gly Val Tyr His Ser Ile Ala
85 90 95
Phe Ala Asn Met Glu Asp Leu Arg Gly Arg Phe Ser Glu Thr Ser Arg
100 105 110
Glu Gly Phe Leu Leu Ala Gln Asp Ile Ser Ser Tyr Ser Leu Thr Ile
115 120 125
Val Ala His Glu Ala Lys Lys Leu Met Pro Glu Gly Ser Ile Val
130 135 140
Ala Thr Thr Tyr Leu Gly Gly Glu Phe Ala Val Gln Asn Tyr Asn Val
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Met Gly Val Ala Lys Ala Ser Leu Glu Ala Asn Val Lys Tyr Leu Ala
165 170 175
Leu Asp Leu Gly Pro Asp Asn Ile Arg Val Asn Ala Ile Ser Ala Gly
180 185 190
Pro Ile Arg Thr Leu Ser Ala Lys Gly Val Gly Gly Phe Asn Thr Ile
195 200 205
Leu Lys Glu Ile Glu Glu Arg Ala Pro Leu Lys Arg Asn Val Asp Gln
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Val Glu Val Gly Lys Thr Ala Ala Tyr Leu Leu Ser Asp Leu Ser Ser
225 230 235 240
Gly Val Thr Gly Glu Asn Ile His Val Asp Ser Gly Phe His Ala
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<210> 13

<211> 1245

<212> DNA

<213> Staphylococcus aureus

<400> 13

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ttaaatgccc atggtacaag tactcctggt ggtgacttaa atgaagttaa agctattaaa 960
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<213> Staphylococcus aureus

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      20           25           30
Val Asn Gly Ile Asp Lys Ile Thr Arg Ile Asp Thr Glu Pro Tyr Ser
      35           40           45
Val His Leu Ala Gly Glu Leu Lys Asn Phe Asn Ile Glu Asp His Ile
      50           55           60
Asp Lys Lys Glu Ala Arg Arg Met Asp Arg Phe Thr Gln Tyr Ala Ile
65           70           75           80
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Val	Ala	Ala	Arg	Glu	Ala	Val	Lys	Asp	Ala	Gln	Leu	Asp	Ile	Asn	Asp			
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Asn	Thr	Ala	Asp	Arg	Ile	Gly	Val	Trp	Ile	Gly	Ser	Gly	Ile	Gly	Gly			
																100	105	110
Met	Glu	Thr	Phe	Glu	Ile	Ala	His	Lys	Gln	Leu	Met	Asp	Lys	Gly	Pro			
																115	120	125
Arg	Arg	Val	Ser	Pro	Phe	Phe	Val	Pro	Met	Leu	Ile	Pro	Asp	Met	Ala			
																130	135	140
Thr	Gly	Gln	Val	Ser	Ile	Asp	Leu	Gly	Ala	Lys	Gly	Pro	Asn	Gly	Ala			
																145	150	155
Thr	Val	Thr	Ala	Cys	Ala	Thr	Gly	Thr	Asn	Ser	Ile	Gly	Glu	Ala	Phe			
																165	170	175
Lys	Ile	Val	Gln	Arg	Gly	Asp	Ala	Asp	Ala	Met	Ile	Thr	Gly	Gly	Thr			
																180	185	190
Glu	Ala	Pro	Ile	Thr	His	Met	Ala	Ile	Ala	Gly	Phe	Ser	Ala	Ser	Arg			
																195	200	205
Ala	Leu	Ser	Thr	Asn	Asp	Asp	Ile	Glu	Thr	Ala	Cys	Arg	Pro	Phe	Gln			
																210	215	220
Glu	Gly	Arg	Asp	Gly	Phe	Val	Met	Gly	Glu	Gly	Ala	Gly	Ile	Leu	Val			
																225	230	235
Ile	Glu	Ser	Leu	Glu	Ser	Ala	Gln	Ala	Arg	Gly	Ala	Asn	Ile	Tyr	Ala			
																245	250	255
Glu	Ile	Val	Gly	Tyr	Gly	Thr	Thr	Gly	Asp	Ala	Tyr	His	Ile	Thr	Ala			
																260	265	270
Pro	Ala	Pro	Glu	Gly	Glu	Gly	Gly	Ser	Arg	Ala	Met	Gln	Ala	Ala	Met			
																275	280	285
Asp	Asp	Ala	Gly	Ile	Glu	Pro	Lys	Asp	Val	Gln	Tyr	Leu	Asn	Ala	His			
																290	295	300
Gly	Thr	Ser	Thr	Pro	Val	Gly	Asp	Leu	Asn	Glu	Val	Lys	Ala	Ile	Lys			
																305	310	315
Asn	Thr	Phe	Gly	Glu	Ala	Ala	Lys	His	Leu	Lys	Val	Ser	Ser	Thr	Lys			
																325	330	335
Ser	Met	Thr	Gly	His	Leu	Leu	Gly	Ala	Thr	Gly	Gly	Ile	Glu	Ala	Ile			
																340	345	350
Phe	Ser	Ala	Leu	Ser	Ile	Lys	Asp	Ser	Lys	Val	Ala	Pro	Thr	Ile	His			
																355	360	365
Ala	Val	Thr	Pro	Asp	Pro	Glu	Cys	Asp	Leu	Asp	Ile	Val	Pro	Asn	Glu			
																370	375	380
Ala	Gln	Asp	Leu	Asp	Ile	Thr	Tyr	Ala	Met	Ser	Asn	Ser	Leu	Gly	Phe			
																385	390	395
																		400

Gly Gly His Asn Ala Val Leu Val Phe Lys Lys Phe Glu Ala
 405 410

<210> 15
 <211> 975
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 15
 atggcttttg caaaaataag tcaggttgct cattatgtgc cagagcaagt gggtacaaat 60
 cagcacttgg ctcagattat ggataccaat gatgagtggg tttcaagtcg aacgggaata 120
 cgacaaaggc atatttcaag aacagaatct accagtgatt tggctacaga gggtgctaag 180
 aaactgatgg caaaagctgg aataacagga aaagaactgg attttatcat cctagctacc 240
 attactccag attcgatgat gccctctaca gctgctcgtg ttcaagctaa tattggcgct 300
 aataaagcct ttgcttttga cttaaccgcg gcttgcagtg gatttgtatt tgctctttca 360
 actgctgaaa agtttatcgc ttctggtcgc tttcaaaaag gcttgggtgat tggtagtgaa 420
 accctctcta aggcagtcga ttggtcggat cgatcaacag ctgtgttgtt tggagatggg 480
 gctgggtggg tcttggtaga agctagcgag caagagcatt tcttagctga gagtcttaat 540
 agcgatggaa gtcgcagcga gtgtttaact tatgggcatt caggtttgca ttctccattt 600
 tcagatcaag aaagtgcaga ttcgtttttg aagatggatg gacgcacagt ctttgatttt 660
 gccattcgag atgtagccaa gtctatcaag cagactattg atgaatctcc tatagagggtg 720
 acagacttgg attatctgct acttcatcaa gccaatgacc gtattttgga taagatgggt 780
 agaaaaattg gtgttgaccg agccaaactt ccagccaata tgatggaata tggcaatacc 840
 agtgcagcca gtatcccgat tttactttca gagtgtgtag aacaagggtc catcccttta 900
 gatggtagcc agactgttct tctatcaggc ttcggtggag gcttgacctg gggcacgctc 960
 attcttaciaa ttttag 975

<210> 16
 <211> 324
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 16
 Met Ala Phe Ala Lys Ile Ser Gln Val Ala His Tyr Val Pro Glu Gln
 1 5 10 15
 Val Val Thr Asn His Asp Leu Ala Gln Ile Met Asp Thr Asn Asp Glu
 20 25 30
 Trp Ile Ser Ser Arg Thr Gly Ile Arg Gln Arg His Ile Ser Arg Thr
 35 40 45

Glu Ser Thr Ser Asp Leu Ala Thr Glu Val Ala Lys Lys Leu Met Ala
 50 55 60
 Lys Ala Gly Ile Thr Gly Lys Glu Leu Asp Phe Ile Ile Leu Ala Thr
 65 70 75 80
 Ile Thr Pro Asp Ser Met Met Pro Ser Thr Ala Ala Arg Val Gln Ala
 85 90 95
 Asn Ile Gly Ala Asn Lys Ala Phe Ala Phe Asp Leu Thr Ala Ala Cys
 100 105 110
 Ser Gly Phe Val Phe Ala Leu Ser Thr Ala Glu Lys Phe Ile Ala Ser
 115 120 125
 Gly Arg Phe Gln Lys Gly Leu Val Ile Gly Ser Glu Thr Leu Ser Lys
 130 135 140
 Ala Val Asp Trp Ser Asp Arg Ser Thr Ala Val Leu Phe Gly Asp Gly
 145 150 155 160
 Ala Gly Gly Val Leu Leu Glu Ala Ser Glu Gln Glu His Phe Leu Ala
 165 170 175
 Glu Ser Leu Asn Ser Asp Gly Ser Arg Ser Glu Cys Leu Thr Tyr Gly
 180 185 190
 His Ser Gly Leu His Ser Pro Phe Ser Asp Gln Glu Ser Ala Asp Ser
 195 200 205
 Phe Leu Lys Met Asp Gly Arg Thr Val Phe Asp Phe Ala Ile Arg Asp
 210 215 220
 Val Ala Lys Ser Ile Lys Gln Thr Ile Asp Glu Ser Pro Ile Glu Val
 225 230 235 240
 Thr Asp Leu Asp Tyr Leu Leu Leu His Gln Ala Asn Asp Arg Ile Leu
 245 250 255
 Asp Lys Met Ala Arg Lys Ile Gly Val Asp Arg Ala Lys Leu Pro Ala
 260 265 270
 Asn Met Met Glu Tyr Gly Asn Thr Ser Ala Ala Ser Ile Pro Ile Leu
 275 280 285
 Leu Ser Glu Cys Val Glu Gln Gly Leu Ile Pro Leu Asp Gly Ser Gln
 290 295 300
 Thr Val Leu Leu Ser Gly Phe Gly Gly Gly Leu Thr Trp Gly Thr Leu
 305 310 315 320
 Ile Leu Thr Ile

<210> 17

<211> 483

<212> DNA

<213> Streptococcus pneumoniae

<400> 17

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gaccgtgtct tggaagtgag cgaggatacc attgttgcta tcaaaaatgt gaccatcaac 180
gagcctttct ttaacggcca ctttcctcaa taccaggtta tgccaggtgt tgtgattatg 240
gaagccttgg cgcaaactgc cgggtgtgtg gagttatcaa aacctgaaaa taaaggaaaa 300
ctggctcttt acgctgggtat ggacaagggt aagttcaaga agcaagttgt accaggcgac 360
caattgggta tgacagcgac ttttgtaaaa cgtcgtggca ccatagctgt ggttgaagca 420
aaggctgaag tggatggcaa gcttgacagc agtggtagcc ttacttttgc aattgggaac 480
taa 483
```

<210> 18

<211> 160

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

```
Met Gly Ser Ser His His His His His His Ser Ser Gly Leu Val Pro
 1             5             10             15
Arg Gly Ser His Met Ile Asp Ile Gln Gly Ile Lys Glu Ala Leu Pro
      20             25             30
His Arg Tyr Pro Met Leu Leu Val Asp Arg Val Leu Glu Val Ser Glu
      35             40             45
Asp Thr Ile Val Ala Ile Lys Asn Val Thr Ile Asn Glu Pro Phe Phe
      50             55             60
Asn Gly His Phe Pro Gln Tyr Pro Val Met Pro Gly Val Val Ile Met
      65             70             75             80
Glu Ala Leu Ala Gln Thr Ala Gly Val Leu Glu Leu Ser Lys Pro Glu
      85             90             95
Asn Lys Gly Lys Leu Val Phe Tyr Ala Gly Met Asp Lys Val Lys Phe
      100            105            110
Lys Lys Gln Val Val Pro Gly Asp Gln Leu Val Met Thr Ala Thr Phe
      115            120            125
Val Lys Arg Arg Gly Thr Ile Ala Val Val Glu Ala Lys Ala Glu Val
      130            135            140
Asp Gly Lys Leu Ala Ala Ser Gly Thr Leu Thr Phe Ala Ile Gly Asn
      145            150            155            160
```


<210> 19
 <211> 1296
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 19
 atgggcagca gccatcatca tcatcatcac agcagcggcc tgggtgccgcg cggcagccat 60
 atgaaactga atcgtgtagt ggtaacaggt tatggagtaa catctccaat cggaaataca 120
 ccagaagaat tttggaatag tttagcaact gggaaaatcg gcattggtgg cattacaaaa 180
 tttgatcata gtgactttga tgtgcataat gcggcagaaa tccaagattt tccgttcgat 240
 aaatactttg taaaaaaaga taccaaccgt tttgataact attctttata tgccttgtat 300
 gcagcccaag aggctgtaaa tcatgccaat cttgatgtag aggctcttaa tagggatcgt 360
 tttggtgtta tcgttgcatac tggatttggg ggaatcaagg aaattgaaga tcaggacttt 420
 cgccttcatg aaaaaggacc caaacgtgtc aaaccaatga ctcttccaaa agctttacca 480
 aatatggctt ctgggaatgt agccatgcgt tttggtgcaa acggtgtttg taaatctatc 540
 aatactgcct gctcttcatac aaatgatgcg attggggatg ccttccgctc cattaagttt 600
 ggtttccaag atgtgatgtt ggtgggagga acagaagctt ctatcacacc ttttgccatc 660
 gctgggtttcc aagccttaac agctctctct actacagagg atccaactcg tgcttcgatac 720
 ccatattgata aggatcgcaa tgggtttgtt atgggtgaag gttcagggat gttggttcta 780
 gaaagtcttg aacacgctga aaaacgtgga gctactatcc tggctgaagt ggttggttac 840
 ggaaataactt gtgatgccta ccacatgact tctccacata cagaaggta gggagctatc 900
 aaggccatca aactagcctt ggaagaagct gagatttctc cagagcaagt agcctatgtc 960
 aatgctcacg gaacgtcaac tcctgccaat gaaaaaggag aaagtgggtc tatcgtagct 1020
 gttcttggta aggaagtacc tgtatcatca accaagtctt ttacaggaca tttgctgggg 1080
 gctgcgggtg cagtagaagc tatcgtcacc atcgaagcta tgcgtcataa ctttgtacca 1140
 atgacagctg ggacaagtga agtatcagat tatatcgaag ctaatgtcgt ttatggacaa 1200
 ggcttggaga aagaaattcc atacgctatt tcaaatactt ttggtttttg aggccacaat 1260
 gcagttcttg ctttcaaacg ttgggagaat cgtaa 1296

<210> 20
 <211> 431
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 20
 Met Gly Ser Ser His His His His His His Ser Ser Gly Leu Val Pro
 1 5 10 15

Arg Gly Ser His Met Lys Leu Asn Arg Val Val Val Thr Gly Tyr Gly
 20 25 30
 Val Thr Ser Pro Ile Gly Asn Thr Pro Glu Glu Phe Trp Asn Ser Leu
 35 40 45
 Ala Thr Gly Lys Ile Gly Ile Gly Gly Ile Thr Lys Phe Asp His Ser
 50 55 60
 Asp Phe Asp Val His Asn Ala Ala Glu Ile Gln Asp Phe Pro Phe Asp
 65 70 75 80
 Lys Tyr Phe Val Lys Lys Asp Thr Asn Arg Phe Asp Asn Tyr Ser Leu
 85 90 95
 Tyr Ala Leu Tyr Ala Ala Gln Glu Ala Val Asn His Ala Asn Leu Asp
 100 105 110
 Val Glu Ala Leu Asn Arg Asp Arg Phe Gly Val Ile Val Ala Ser Gly
 115 120 125
 Ile Gly Gly Ile Lys Glu Ile Glu Asp Gln Val Leu Arg Leu His Glu
 130 135 140
 Lys Gly Pro Lys Arg Val Lys Pro Met Thr Leu Pro Lys Ala Leu Pro
 145 150 155 160
 Asn Met Ala Ser Gly Asn Val Ala Met Arg Phe Gly Ala Asn Gly Val
 165 170 175
 Cys Lys Ser Ile Asn Thr Ala Cys Ser Ser Ser Asn Asp Ala Ile Gly
 180 185 190
 Asp Ala Phe Arg Ser Ile Lys Phe Gly Phe Gln Asp Val Met Leu Val
 195 200 205
 Gly Gly Thr Glu Ala Ser Ile Thr Pro Phe Ala Ile Ala Gly Phe Gln
 210 215 220
 Ala Leu Thr Ala Leu Ser Thr Thr Glu Asp Pro Thr Arg Ala Ser Ile
 225 230 235 240
 Pro Phe Asp Lys Asp Arg Asn Gly Phe Val Met Gly Glu Gly Ser Gly
 245 250 255
 Met Leu Val Leu Glu Ser Leu Glu His Ala Glu Lys Arg Gly Ala Thr
 260 265 270
 Ile Leu Ala Glu Val Val Gly Tyr Gly Asn Thr Cys Asp Ala Tyr His
 275 280 285
 Met Thr Ser Pro His Pro Glu Gly Gln Gly Ala Ile Lys Ala Ile Lys
 290 295 300
 Leu Ala Leu Glu Glu Ala Glu Ile Ser Pro Glu Gln Val Ala Tyr Val
 305 310 315 320
 Asn Ala His Gly Thr Ser Thr Pro Ala Asn Glu Lys Gly Glu Ser Gly
 325 330 335

Ala	Ile	Val	Ala	Val	Leu	Gly	Lys	Glu	Val	Pro	Val	Ser	Ser	Thr	Lys
			340					345					350		
Ser	Phe	Thr	Gly	His	Leu	Leu	Gly	Ala	Ala	Gly	Ala	Val	Glu	Ala	Ile
			355				360					365			
Val	Thr	Ile	Glu	Ala	Met	Arg	His	Asn	Phe	Val	Pro	Met	Thr	Ala	Gly
			370				375				380				
Thr	Ser	Glu	Val	Ser	Asp	Tyr	Ile	Glu	Ala	Asn	Val	Val	Tyr	Gly	Gln
385					390					395					400
Gly	Leu	Glu	Lys	Glu	Ile	Pro	Tyr	Ala	Ile	Ser	Asn	Thr	Phe	Gly	Phe
				405					410					415	
Gly	Gly	His	Asn	Ala	Val	Leu	Ala	Phe	Lys	Arg	Trp	Glu	Asn	Arg	
			420					425					430		

<210> 21

<211> 1273

<212> DNA

<213> Escherichia coli

<400> 21

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tcgcgattga acaggcagtg caggcgggtgc agcgacaagt tcctcagcga attgccgctc 60
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tgcggtagca ggacgctgcc agcgaactcg cagtttgcaa gtgacggtat ataaccgaaa 180
agtgactgag cgtacatgta tacgaagatt attgggtactg gcagctatct gcccgaaaca 240
gtgcggacaa acgccgattt ggaaaaaatg gtggacacct ctgacgagtg gattgtcact 300
cgtaccggtg tccgcgaacg ccacattgcc gcgccaaacg aaaccgtttc aaccatgggc 360
tttgaagcgg cgacacgcgc aattgagatg gcgggcattg agaaagacca gattggcctg 420
atcgtttgtg caacgacttc tgctacgcac gctttcccgga gcgcagcttg tcagattcaa 480
agcatgttgg gcattaaagg ttgcccggca tttgacgttg cagcagcctg cgcaggtttc 540
acctatgcat taagcgtagc cgatcaatac gtgaaatctg gggcggtgaa gtatgctctg 600
gtcgtcgggt ccgatgtact ggcgcgcacc tgcgatccaa ccgatcgtgg gactattatt 660
atTTTTTggcg atggcgcggg cgctgcggtg ctggctgcct ctgaagagcc gggaatcatt 720
tccacccatc tgcattgccga cggtagttat ggtgaattgc tgacgctgcc aaacgccgac 780
cgcgtgaatc cagagaattc aattcatctg acgatggcgg gcaacgaagt cttcaagggt 840
gcggtaacgg aactggcgca catcgttgat gagacgctgg cggcgaataa tcttgaccgt 900
tctcaactgg actggctggg tccgcacag gctaacctgc gtattatcag tgcaacggcg 960
aaaaaactcg gtatgtctat ggataatgtc gtggtgacgc tggatcgcca cggtaatacc 1020
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gggcagttgg ttctgcttga agcctttggc ggtggattca cctggggctc cgcgctgggt 1140
cgtttctagg ataaggatta aaacatgacg caatttgcac ttgtgttccc tggacagggt 1200

```


Leu Val Pro His Gln Ala Asn Leu Arg Ile Ile Ser Ala Thr Ala Lys
 245 250 255
 Lys Leu Gly Met Ser Met Asp Asn Val Val Val Thr Leu Asp Arg His
 260 265 270
 Gly Asn Thr Ser Ala Ala Ser Val Pro Cys Ala Leu Asp Glu Ala Val
 275 280 285
 Arg Asp Gly Arg Ile Lys Pro Gly Gln Leu Val Leu Leu Glu Ala Phe
 290 295 300
 Gly Gly Gly Phe Thr Trp Gly Ser Ala Leu Val Arg Phe
 305 310 315

<210> 23
 <211> 789
 <212> DNA
 <213> Escherichia coli

<400> 23
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 aacgacaaac tgaaaggccg cgtagaagaa ttgcccgtc aattgggttc tgacatcgtt 180
 ctgcagtgcg atgttgacaga agatgccagc atcgacacca tgttcgctga actggggaaa 240
 gtttggccga aatttgacgg ttctgtacac tctattgggt ttgcacctgg cgatcagctg 300
 gatggtgact atgttaacgc cgttaccctg gaaggcttca aaattgcccga cgacatcagc 360
 tcctacagct tcgttgcaat ggcaaaagct tgccgctcca tgctgaatcc gggttctgcc 420
 ctgctgaccc ttctctacct tggcgctgag cgcgctatcc cgaactacaa cgttatgggt 480
 ctggcaaaag cgtctctgga agcgaacgtg cgctatatgg cgaacgcgat gggtcaggaa 540
 ggtgtgcgtg ttaacgcat ctctgctggt ccgatccgta ctctggcggc ctccggtatc 600
 aaagacttcc gcaaaatgct ggctcattgc gaagccggtta ccccgattcg ccgtaccgtt 660
 actattgaag atgtgggtaa ctctgctgga ttctgtgct ccgatctctc tgccggtatc 720
 tccggtgaag tggccacgt tgacggcggt ttcagcattg ctgcaatgaa cgaactcgaa 780
 ctgaaataa 789

<210> 24
 <211> 262
 <212> PRT
 <213> Escherichia coli

<400> 24

Met Gly Phe Leu Ser Gly Lys Arg Ile Leu Val Thr Gly Val Ala Ser
 1 5 10 15
 Lys Leu Ser Ile Ala Tyr Gly Ile Ala Gln Ala Met His Arg Glu Gly
 20 25 30
 Ala Glu Leu Ala Phe Thr Tyr Gln Asn Asp Lys Leu Lys Gly Arg Val
 35 40 45
 Glu Glu Phe Ala Ala Gln Leu Gly Ser Asp Ile Val Leu Gln Cys Asp
 50 55 60
 Val Ala Glu Asp Ala Ser Ile Asp Thr Met Phe Ala Glu Leu Gly Lys
 65 70 75 80
 Val Trp Pro Lys Phe Asp Gly Phe Val His Ser Ile Gly Phe Ala Pro
 85 90 95
 Gly Asp Gln Leu Asp Gly Asp Tyr Val Asn Ala Val Thr Arg Glu Gly
 100 105 110
 Phe Lys Ile Ala His Asp Ile Ser Ser Tyr Ser Phe Val Ala Met Ala
 115 120 125
 Lys Ala Cys Arg Ser Met Leu Asn Pro Gly Ser Ala Leu Leu Thr Leu
 130 135 140
 Ser Tyr Leu Gly Ala Glu Arg Ala Ile Pro Asn Tyr Asn Val Met Gly
 145 150 155 160
 Leu Ala Lys Ala Ser Leu Glu Ala Asn Val Arg Tyr Met Ala Asn Ala
 165 170 175
 Met Gly Pro Glu Gly Val Arg Val Asn Ala Ile Ser Ala Gly Pro Ile
 180 185 190
 Arg Thr Leu Ala Ala Ser Gly Ile Lys Asp Phe Arg Lys Met Leu Ala
 195 200 205
 His Cys Glu Ala Val Thr Pro Ile Arg Arg Thr Val Thr Ile Glu Asp
 210 215 220
 Val Gly Asn Ser Ala Ala Phe Leu Cys Ser Asp Leu Ser Ala Gly Ile
 225 230 235 240
 Ser Gly Glu Val Val His Val Asp Gly Gly Phe Ser Ile Ala Ala Met
 245 250 255
 Asn Glu Leu Glu Leu Lys
 260

<210> 25

<211> 234

<212> DNA

<213> Staphylococcus aureus

<400> 25

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atggaaaatt tcgataaagt aaaagatatc atcggttgacc gtttaggtgt agacgctgat 60
aaagtaactg aagatgcatac tttcaaagat gatttaggcg ctgactcact tgatatcgct 120
gaattagtaa tggaattaga agacgagttt ggtactgaaa ttcctgatga agaagctgaa 180
aaaatcaaca ctgttggtga tgctgttaaa tttattaaca gtcttgaaaa ataa      234
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<210> 26

<211> 77

<212> PRT

<213> *Staphylococcus aureus*

<400> 26

```
Met Glu Asn Phe Asp Lys Val Lys Asp Ile Ile Val Asp Arg Leu Gly
  1              5              10             15
Val Asp Ala Asp Lys Val Thr Glu Asp Ala Ser Phe Lys Asp Asp Leu
      20              25             30
Gly Ala Asp Ser Leu Asp Ile Ala Glu Leu Val Met Glu Leu Glu Asp
      35              40             45
Glu Phe Gly Thr Glu Ile Pro Asp Glu Glu Ala Glu Lys Ile Asn Thr
      50              55             60
Val Gly Asp Ala Val Lys Phe Ile Asn Ser Leu Glu Lys
      65              70             75
```

<210> 27

<211> 234

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 27

```
atgaaagaaa aagaaatddd tgacagtatt gtgaccatta tccaagagcg acagggagag 60
gactttgtcg tgacagaatc cttgagtctg aaagacgact tggatgctga ctcagttgat 120
ttgatggagt ttatcttgac gctggaggat gaatttagta tcgaaatcag cgatgaggaa 180
attgaccaac tccaaagtgt aggagatgtg gttaaaatca ttcaaggaaa atag      234
```

<210> 28

<211> 77

<212> PRT

<213> *Streptococcus pneumoniae*

<400> 28

```
Met Lys Glu Lys Glu Ile Phe Asp Ser Ile Val Thr Ile Ile Gln Glu
 1           5           10           15
Arg Gln Gly Glu Asp Phe Val Val Thr Glu Ser Leu Ser Leu Lys Asp
          20           25           30
Asp Leu Asp Ala Asp Ser Val Asp Leu Met Glu Phe Ile Leu Thr Leu
          35           40           45
Glu Asp Glu Phe Ser Ile Glu Ile Ser Asp Glu Glu Ile Asp Gln Leu
          50           55           60
Gln Ser Val Gly Asp Val Val Lys Ile Ile Gln Gly Lys
65           70           75
```

<210> 29

<211> 225

<212> DNA

<213> Streptococcus pneumoniae

<400> 29

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atggcagtat ttgaaaaagt acaagaaatt atcgttgaag aacttggaag agacgcatca 60
gaagtaacac ttgaatcaac ttttgatgat ttggacgcag attcattgga cttgttccaa 120
gtaatctcag aaatcgaaga tgcttttgat atccaaatcg aagcagaaaa tgacttgaaa 180
acagttggtg acttggttgc ttacgttgaa gagcaagcaa aataa 225
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<210> 30

<211> 74

<212> PRT

<213> Streptococcus pneumoniae

<400> 30

```
Met Ala Val Phe Glu Lys Val Gln Glu Ile Ile Val Glu Glu Leu Gly
 1           5           10           15
Lys Asp Ala Ser Glu Val Thr Leu Glu Ser Thr Phe Asp Asp Leu Asp
          20           25           30
Ala Asp Ser Leu Asp Leu Phe Gln Val Ile Ser Glu Ile Glu Asp Ala
          35           40           45
Phe Asp Ile Gln Ile Glu Ala Glu Asn Asp Leu Lys Thr Val Gly Asp
          50           55           60
```


Leu Val Ala Tyr Val Glu Glu Gln Ala Lys
65 70

<210> 31

<211> 951

<212> DNA

<213> Haemophilus influenzae

<400> 31

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atgaatagta gaattttatc caccggtagc tatctgccga gccatattcg cacaaatgcg 60
gatttagaaa aaatgggtga tacatcagat gaatggattg tcaactcggtc tggatatccgt 120
gaacgtcgta tcgcagcgga agatgaaact gttgcaacaa tgggatttga agcggcaaaa 180
aatgcgatcg aagctgctca aattaatcct caagatattg aactgattat tggttgcaact 240
acaagtcact cacatgctta tccaagtgcg gcttgccaag tgcaagggtt attaaatatt 300
gatgatgcga tttcttttga tttagccgca gcttgcacag gctttgtcta tgctttgagc 360
gtagctgata aattttattcg tgcaggcaaa gtgaaaaaag ccttagtgat aggctcagat 420
ctcaattctc gtaaattaga tgaaacagat cgcagcactg ttgtgctatt tggatgatgg 480
gcgggtgctg taattttaga agcgagtga caagaaggaa ttatctccac ccatttacac 540
gcttcagcaa ataaaaataa tgcccttggt ttagctcagc cagaacgtgg tatagaaaaa 600
tctggctata tcgagatgca aggtaacgaa acgttcaaat tggcagttcg tgaactttca 660
aatgtagtgg aggaaacact ttcagccaat aatttagata aaaaagattt agactggctt 720
gtgccacacc aagcaaattt acgtattatt acagcgacag ctaaaaaatt agaaatggat 780
atgtcgcaag tgggtggtaac gttagataaa tacgctaata acagtgcagc aacagtgcct 840
gtcgctttag atgaggctgt tcgagatggc cgtattcaac gtgggcagtt actattatta 900
gaagcctttg gcggtggttg gacttggggt tcagcggttag tgagatttta g 951
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<210> 32

<211> 316

<212> PRT

<213> Haemophilus influenzae

<400> 32

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Met Asn Ser Arg Ile Leu Ser Thr Gly Ser Tyr Leu Pro Ser His Ile
 1           5           10          15
Arg Thr Asn Ala Asp Leu Glu Lys Met Val Asp Thr Ser Asp Glu Trp
          20          25          30
Ile Val Thr Arg Ser Gly Ile Arg Glu Arg Arg Ile Ala Ala Glu Asp
      35           40           45
```

Glu Thr Val Ala Thr Met Gly Phe Glu Ala Ala Lys Asn Ala Ile Glu
 50 55 60
 Ala Ala Gln Ile Asn Pro Gln Asp Ile Glu Leu Ile Ile Val Ala Thr
 65 70 75 80
 Thr Ser His Ser His Ala Tyr Pro Ser Ala Ala Cys Gln Val Gln Gly
 85 90 95
 Leu Leu Asn Ile Asp Asp Ala Ile Ser Phe Asp Leu Ala Ala Ala Cys
 100 105 110
 Thr Gly Phe Val Tyr Ala Leu Ser Val Ala Asp Gln Phe Ile Arg Ala
 115 120 125
 Gly Lys Val Lys Lys Ala Leu Val Ile Gly Ser Asp Leu Asn Ser Arg
 130 135 140
 Lys Leu Asp Glu Thr Asp Arg Ser Thr Val Val Leu Phe Gly Asp Gly
 145 150 155 160
 Ala Gly Ala Val Ile Leu Glu Ala Ser Glu Gln Glu Gly Ile Ile Ser
 165 170 175
 Thr His Leu His Ala Ser Ala Asn Lys Asn Asn Ala Leu Val Leu Ala
 180 185 190
 Gln Pro Glu Arg Gly Ile Glu Lys Ser Gly Tyr Ile Glu Met Gln Gly
 195 200 205
 Asn Glu Thr Phe Lys Leu Ala Val Arg Glu Leu Ser Asn Val Val Glu
 210 215 220
 Glu Thr Leu Ser Ala Asn Asn Leu Asp Lys Lys Asp Leu Asp Trp Leu
 225 230 235 240
 Val Pro His Gln Ala Asn Leu Arg Ile Ile Thr Ala Thr Ala Lys Lys
 245 250 255
 Leu Glu Met Asp Met Ser Gln Val Val Val Thr Leu Asp Lys Tyr Ala
 260 265 270
 Asn Asn Ser Ala Ala Thr Val Pro Val Ala Leu Asp Glu Ala Val Arg
 275 280 285
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gttgagctgg taatggctct ggagaagagt ttgatactga gattccggac gaagaagctg 180
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<213> Escherichia coli

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Leu Gly Ala Asp Ser Leu Asp Thr Val Glu Leu Val Met Ala Leu Glu
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Glu Glu Phe Asp Thr Glu Ile Pro Asp Glu Glu Ala Glu Lys Ile Thr
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Thr Val Gln Ala Ala Ile Asp Tyr Ile Asn Gly His Gln Ala
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<213> Streptococcus pneumoniae

<400> 37

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35 40 45
Glu Val Val Lys Ala Asn Ile Asp Lys Ile Lys Ser Leu Thr Asp Lys
50 55 60
Pro Phe Gly Val Asn Ile Met Leu Leu Ser Pro Phe Val Glu Asp Ile
65 70 75 80
Val Asp Leu Val Ile Glu Glu Gly Val Lys Val Val Thr Thr Gly Ala
85 90 95
Gly Asn Pro Ser Lys Tyr Met Glu Arg Phe His Glu Ala Gly Ile Ile
100 105 110
Val Ile Pro Val Val Pro Ser Val Ala Leu Ala Lys Arg Met Glu Lys
115 120 125
Ile Gly Ala Asp Ala Val Ile Ala Glu Gly Met Glu Ala Gly Gly His
130 135 140
Ile Gly Lys Leu Thr Thr Met Thr Leu Val Arg Gln Val Ala Thr Ala
145 150 155 160
Ile Ser Ile Pro Val Ile Ala Ala Gly Gly Ile Ala Asp Gly Glu Gly
165 170 175
Ala Ala Ala Gly Phe Met Leu Gly Ala Glu Ala Val Gln Val Gly Thr
180 185 190
Arg Phe Val Val Ala Lys Glu Ser Asn Ala His Pro Asn Tyr Lys Glu
195 200 205
Lys Ile Leu Lys Ala Arg Asp Ile Asp Thr Thr Ile Ser Ala Gln His
210 215 220
Phe Gly His Ala Val Arg Ala Ile Lys Asn Gln Leu Thr Arg Asp Phe
225 230 235 240
Glu Leu Ala Glu Lys Asp Ala Phe Lys Gln Glu Asp Pro Asp Leu Glu
245 250 255

Ile Phe Glu Gln Met Gly Ala Gly Ala Leu Ala Lys Ala Val Val His
260 265 270
Gly Asp Val Asp Gly Gly Ser Val Met Ala Gly Gln Ile Ala Gly Leu
275 280 285
Val Ser Lys Glu Glu Thr Ala Glu Glu Ile Leu Lys Asp Leu Tyr Tyr
290 295 300
Gly Ala Ala Lys Lys Ile Gln Glu Glu Ala Ser Arg Trp Ala Gly Val
305 310 315 320
Val Arg Asn Asp